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## PATENT ABSTRACTS OF JAPAN

(11)Publication number : **08-172025**

(43)Date of publication of application : **02.07.1996**

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(51)Int.Cl. **H01G 2/06**

**H01G 4/12**

**H01G 4/30**

**H01G 4/38**

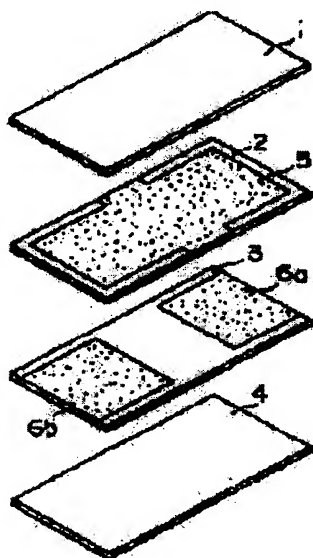
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### (54) CHIP CAPACITOR



#### (57)Abstract:

**PURPOSE:** To improve the mounting density of a chip capacitor and to reduce mounting costs by arranging multiple first thick film electrodes, in the state separated each other, on one side across a substrate and arranging the second thick film electrode in the position corresponding to those first thick film electrodes on the other side.

**CONSTITUTION:** Of green sheets 1-4 obtained by printing and drying, by doctor blade method, a dielectric slurry on the base sheet of polyester, the dielectric slurry is printed and dried on the green sheets 2 and 3, and further, the dielectric paste is printed and dried by the doctor blade method so that a specified shape is obtained, thus, the second thick film electrode 5 and the first thick film electrodes 6a and 6b are formed.

Of these thick film electrodes 5, 6a and 6b,

capacitor elements 10 and 11 are formed in equivalent circuits of the thick film electrode pair 5 and 6a and the thick film electrode pair 5 and 6b, with the green sheet 2 in between.

[Claim 1] The substrate containing a dielectric, and two or more 1st thick-film electrodes arranged at the condition of having separated into one field of this substrate mutually, The 2nd thick-film electrode which comes to form each capacitor among said each of two or more 1st thick-film electrodes arranged in the location which counters said two or more 1st thick-film electrodes of another field of this substrate, The 1st covering plate which sandwiches said two or more 1st thick-film electrodes between said substrates, The chip capacitor characterized by having the 2nd covering plate which sandwiches said 2nd thick-film electrode between said substrates, two or more 1st external electrodes which connected with said each of two or more 1st thick-film electrodes, and were exposed outside, and the 2nd external electrode which connected with said 2nd thick-film electrode, and was exposed outside.

## PRIOR ART

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[Description of the Prior Art] Conventionally, the chip capacitor is widely used as an object for the high frequency noise rejection of electronic equipment. That is, the chip capacitor is mounted between the signal lines and grounds which were formed, for example on the circuit board of electronic equipment. By bypassing a high frequency noise to a ground with the chip capacitor, a high frequency noise is removed and malfunction of electronic equipment etc. is prevented.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the chip capacitor used for the noise rejection of electronic equipment etc.

[0002]

[Description of the Prior Art] Conventionally, the chip capacitor is widely used as an object for the high frequency noise rejection of electronic equipment. That is, the chip capacitor is mounted between the signal lines and grounds which were formed, for example on the circuit board of electronic equipment. By bypassing a high frequency noise to a ground with the chip capacitor, a high frequency noise is removed and malfunction of electronic equipment etc. is prevented.

[0003]

[Problem(s) to be Solved by the Invention] However, when only one capacitor element was not built in a chip capacitor but it was going to mount the chip capacitor conventionally between a majority of signal lines [ each of ] on the circuit board, and a ground, a large area was needed, it is difficult to raise the packaging density of the circuit board, and mounting took time and effort, and it had become the cause of a cost rise.

[0004] In view of the above-mentioned situation, this invention aims at proposing the chip capacitor with which reduction-ization of mounting cost was attained while it raises packaging density.

[0005]

[Means for Solving the Problem] The chip capacitor of this invention which attains the above-mentioned purpose (1) -- the substrate (2) containing a dielectric -- two or more 1st thick-film electrodes (3) arranged at the condition of having separated into one field of the substrate mutually -- another field of the substrate Have been arranged in the location which counters the 1st thick-film electrode of the above-mentioned plurality. The 2nd thick-film electrode [ 1st ] of the thick-film electrode (4) above-mentioned plurality which comes to form each capacitor between each 1st thick-film electrode of the above-mentioned plurality between the above-mentioned substrates The 1st thick-film electrode of the covering plate (5) above 2nd to insert between the above-mentioned substrates It is characterized by having the 2nd external electrode which connected with two or more 1st thick-film electrodes of the external electrode (7) above 2nd which connected with each 2nd thick-film electrode [ 1st ] of the covering plate (6) above-mentioned plurality to insert, and were exposed outside, and was exposed outside.

[0006]

[Function] Since the substrate of while was pinched, the chip capacitor of this invention has arranged two or more 1st thick-film electrodes in the condition of having separated into the field mutually, as mentioned above and the 2nd thick-film electrode has been arranged in the location which counters the 1st thick-film electrode of these plurality of the field of another side, two or more capacitor elements are formed in one chip capacitor. Therefore, as compared with the case where many chip capacitors with which two or more capacitor elements with one chip capacitor will be mounted when this chip capacitor is mounted in the circuit board, for example, only one capacitor element of the conventional technique was built in are mounted, the mounting tooth space of a chip capacitor of the circuit board is small, and ends, and improvement in the packaging density to the circuit board of a chip capacitor is achieved easily.

[0007] Moreover, the time and effort of mounting to the circuit board is mitigated, and reduction-ization of mounting cost is attained.

[0008]

[Example] Hereafter, the example of this invention is explained. The appearance perspective view of a chip capacitor and drawing 3 of drawing and drawing 2 which showed the green sheet in the process in which drawing 1 R> 1 manufactures a chip capacitor are the representative circuit schematic. Here, the green sheets 1-4 of four sheets shown in drawing 1 are prepared. Those green sheets 1-4 are produced by printing a dielectric slurry with a doctor blade method to the base sheet of polyester, and drying to it. The dielectric materials used here are PbO, La<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, and TiO<sub>2</sub>. Wet blending is carried out, and it is fine particles with a mean particle diameter of 0.1 micrometers ground by the wet mill after 2-hour baking at 1150 degrees C, and has the presentation of Pb<sub>0.88</sub>La<sub>0.12</sub>Zr<sub>0.7</sub>Ti<sub>0.3</sub>O<sub>0.08</sub>.

[0009] Among the green sheets 1-4 of these four sheets, after printing a dielectric slurry and drying, a conductive paste is printed and dried to green sheets 2 and 3 with a doctor blade method, and, thereby, the thick-film electrode 5 (2nd thick-

film electrode said to this invention) and the thick-film electrodes 6a and 6b (two or more 1st thick-film electrodes said to this invention) are formed in them so that it may become the configuration of illustration further, respectively. The capacitor elements 10 and 11 in the equal circuit shown in drawing 3 are formed, respectively of the pair of the thick-film electrodes 5 and 6a which sandwich a green sheet 2 among these thick-film electrodes 5, 6a, and 6b, and the pair of the thick-film electrodes 5 and 6b.

[0010] Moreover, the thick-film electrodes 5, 6a, and 6b are covered with a green sheet 1 and green sheets 3 and 4, and it is protected. After the laminating of the green sheets 1-4 of four sheets formed as mentioned above is carried out mutually and they are unified by thermocompression bonding, it is calcinated and a sintered compact is obtained. A conductive paste is applied to the part which carried out barrel finishing of the sintered compact, and was made to expose the thick-film electrodes 5, 6a, and 6b from the side face of the sintered compact, and these thick-films electrodes 5, 6a, and 6b exposed. By this As shown in drawing 2 , the external electrodes 7 and 8 connected with the thick-film electrodes 6a and 6b, respectively and the external electrodes 9a and 9b connected with the thick-film electrode 5 are formed. Thus, the chip capacitor of the configuration shown in drawing 2 with which two capacitor elements were built in is completed.

[0011] In this example, since two capacitor elements are built in one chip capacitor, compared with the case where the conventional chip capacitor with which one capacitor element was built in is mounted in the circuit board, the mounting tooth space of a chip capacitor is small, and it ends, and mounting cost is also reduced.

[0012]

[Effect of the Invention] As explained above, while the chip capacitor suitable for the high density assembly of a capacitor is constituted, therefore improvement in the packaging density to the circuit board of a chip capacitor is achieved, according to this invention, reduction-ization of mounting cost is also attained.

[Brief Description of the

Drawings]

[Drawing 1] It is drawing having shown the green sheet in the process in which a chip capacitor is manufactured.

[Drawing 2] It is the appearance perspective view of a chip capacitor.

[Drawing 3] It is the representative circuit schematic of a chip capacitor.

[Description of Notations]

1, 2, 3, 4 Green sheet

5, 6a, 6b Thick-film electrode

7, 8, 9a, 9b External electrode

10 11 Capacitor element

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[Drawing 1]

DRAWINGS

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